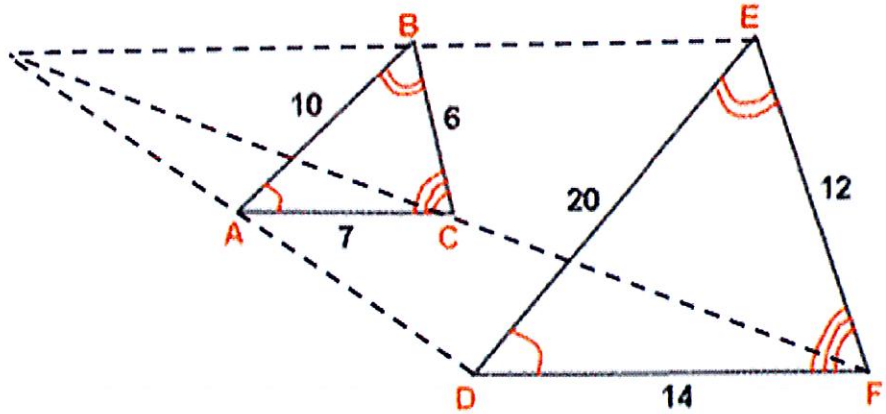
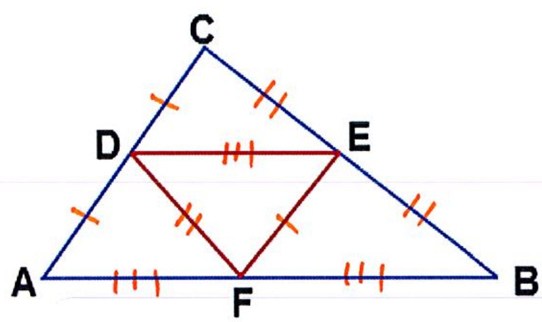
WLPCS
Geometry

FINAL EXAM REVIEW – Similarity (including midsegments and dilations)



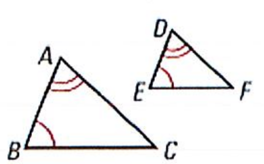
Midsegment Theorem: A midsegment connecting two sides of a triangle is parallel to the third side and is half as long.



Ex: If DE = 3, then AB = 6 AND $\overline{DE} \parallel \overline{AB}$

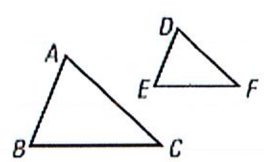
Shortcuts to proving triangles similar:

AA Similarity Postulate



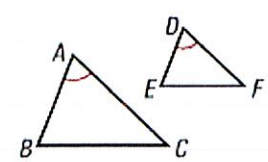
If $\angle A \cong \angle D$ and $\angle B \cong \angle E$, then $\triangle ABC \sim \triangle DEF$.

SSS Similarity Theorem



If $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$, then $\triangle ABC \sim \triangle DEF$.

SAS Similarity Theorem



If $\angle A \cong \angle D$ and $\frac{AB}{DE} = \frac{AC}{DF}$ then $\triangle ABC \sim \triangle DEF$.

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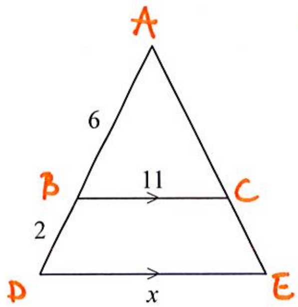
Geometry

1. Explain why the triangles are similar. Then find the value of *x*.



Not drawn to scale

They are similar b/c they share $\angle A$ ($\angle A \cong \angle A$ by the reflexive property. B/c $\overline{BC} \parallel \overline{DE}$, $\angle ABC$ and $\angle ADE$ are congruent (corresponding angles are congruent when lines are parallel). $\triangle ABC \sim \triangle ADE$ by AA.

$\frac{6}{8} = \frac{11}{x}$ $x = 14\frac{2}{3}$

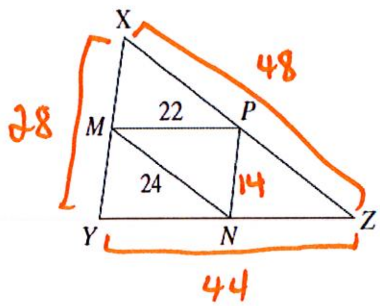
2. M, P, and N are midpoints. Given triangle MNP has a perimeter of 60 cm, what is the perimeter of XYZ?

$60\text{ cm} = 22\text{ cm} + 24\text{ cm} + x\text{ cm}$

$14\text{ cm} = x$

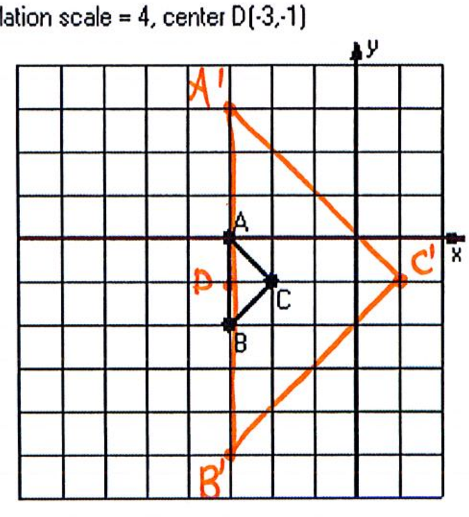
$\text{Perimeter}_{\triangle XYZ} = 28 + 48 + 44$

$= 120\text{ cm}$

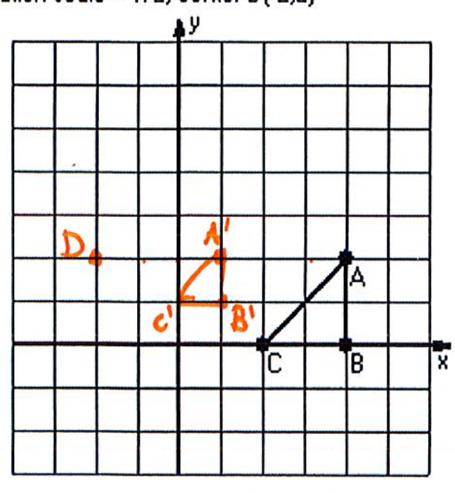


Directions: Perform the dilation according to the scale factor and center of dilation.

3) Dilation scale = 4, center D(-3,-1)



4) Dilation scale = 1/2, center D(-2,2)



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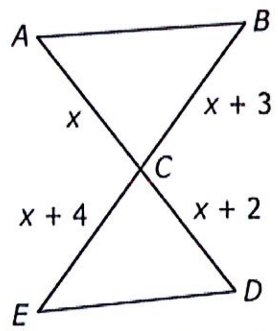
Geometry
5.

In the figure shown, the lengths of segments *AC*, *BC*, *CD*, and *CE* are given in terms of the variable *x*.

If you substitute a value for x, you will see that the sides are not proportional.



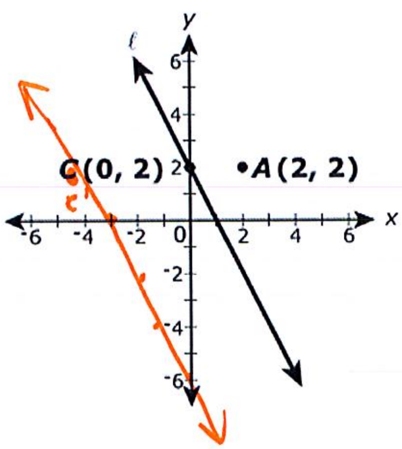
not to scale

No, b/c if $\overline{AB} \parallel \overline{DE}$, $\triangle ABC \sim \triangle DCE$ by AA. $\angle ACB \cong \angle DCE$ (vertical angles are $\cong$) and $\angle E \cong \angle B$ (alt. int. $\measuredangle$s are $\cong$ when lines are $\parallel$). Since the $\triangle$s are $\sim$, the sides must be proportional and they are not:

If $\overline{AB} \parallel \overline{DE}$, are the dimensions reasonable? Justify your answer.

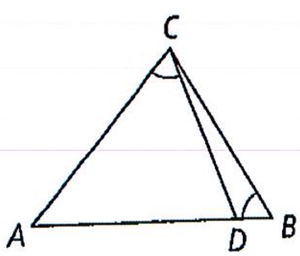
Solving the proportion will give you an answer of -6. This does not make sense as a side length!

6. In the coordinate plane shown, line *l* passes through point C and has a slope of -2. A dilation of line *l* with center *A* and a scale factor of 3 will produce a new line through point *C'*, the image of point *C*, with coordinates (-4 , 2) and a slope of -2 .

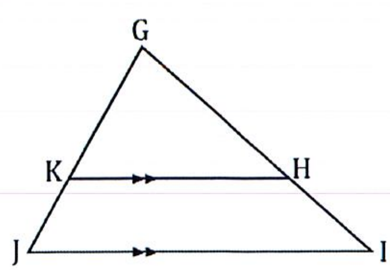


7. Complete the proofs on a separate sheet of paper.

Given: $\angle ABC \cong \angle ACD$
Prove: $\triangle ABC \sim \triangle ACD$



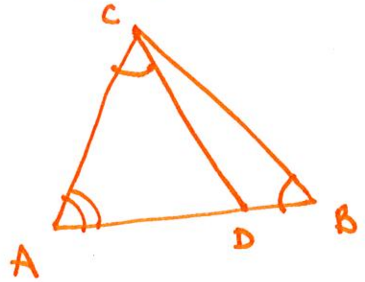
Given: JI||KH



Prove: $\triangle JGI \sim \triangle KGH$

7. Given: $\angle ABC \cong \angle ACD$

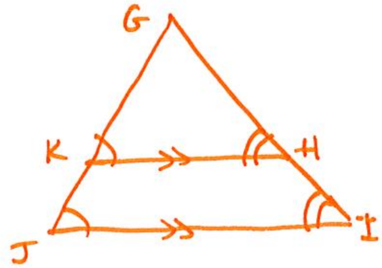
Prove: $\triangle ABC \sim \triangle ACD$



Statements	Reasons
1. $\angle ABC \cong \angle ACD$	1. Given
2. $\angle A \cong \angle A$	2. Reflexive Prop.
3. $\triangle ABC \sim \triangle ACD$	3. AA (Angle Angle)

Given: $\overline{JI} \parallel \overline{KH}$

Prove: $\triangle JGI \sim \triangle KGH$



Statements	Reasons
1. $\overline{JI} \parallel \overline{KH}$	1. Given
2. $\angle GKH \cong \angle GJI$ $\angle GHK \cong \angle GIJ$	2. corresponding angles are $\cong$ when lines are parallel
3. $\triangle JGI \sim \triangle KGH$	3. AA

☆ You can also use $\angle G \cong \angle G$ by Reflexive Property for the second proof

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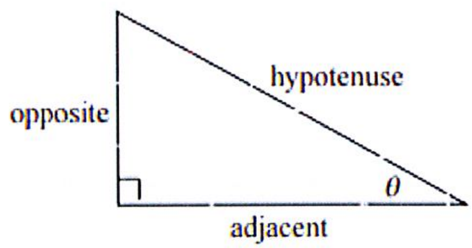
Geometry

FINAL EXAM REVIEW – Trigonometry

- We will focus on **right triangle trigonometry**... so we can only work with **right triangles**.
- There are **three** trigonometric functions we have worked with. Each is a **ratio**.



$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$$
$$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$
$$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$

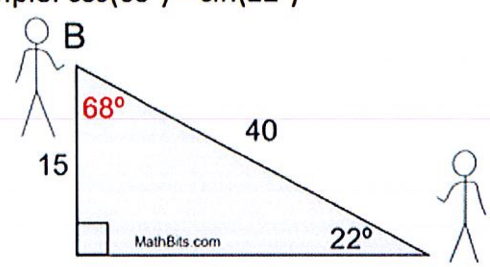
- Inverse trigonometric functions:

$$\theta = \cos^{-1}(x) \quad \Leftrightarrow \quad x = \cos(\theta)$$
$$\theta = \sin^{-1}(x) \quad \Leftrightarrow \quad x = \sin(\theta)$$
$$\theta = \tan^{-1}(x) \quad \Leftrightarrow \quad x = \tan(\theta)$$

- Complementary Angles:

- $\sin\theta = \cos(90^\circ - \theta)$
- $\cos\theta = \sin(90^\circ - \theta)$

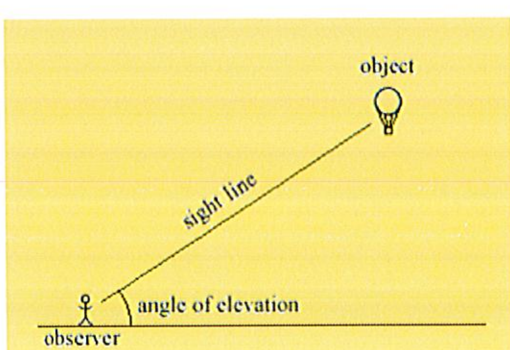
Example: cos(68°) = sin(22°)

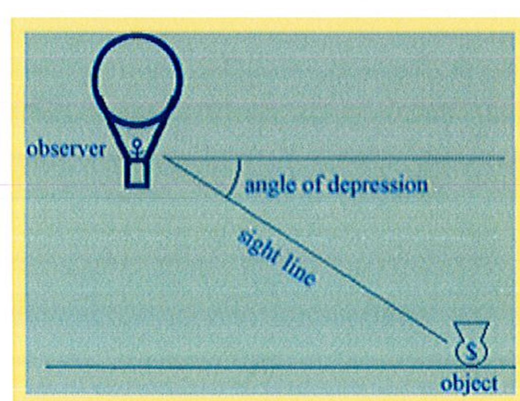


- Word Problems:

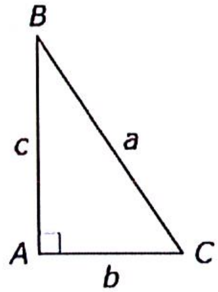
Angle of Elevation – The angle formed by the horizontal and the line of sight above the horizontal (to see an object that is higher than the observer).

Angle of Depression – The angle formed by the horizontal and the line of sight below the horizontal (to see an object that is lower than the observer).





1. The figure shows right $\triangle ABC$.



Which of the listed values are equal to the sine of B? $\sin B = \frac{b}{a}$ $\left(\frac{opp}{hyp}\right)$

Select **all** that apply.

☐ A. $\frac{b}{c}$ No! This would be $\tan B$

☐ B. $\frac{c}{a}$ No! This would be $\cos B$

☑ C. $\frac{b}{a}$

☐ D. the cosine of B No! This is $\frac{c}{a}$

☑ E. the cosine of C (also $\frac{b}{a}$)

☑ F. the cosine of $(90^\circ - B)$ $(90^\circ - B) = \angle C$ $\cos C = \frac{b}{a}$

☑ G. the sine of $(90^\circ - C)$ $(90 - C) = \angle B$ $\sin B = \frac{b}{a}$

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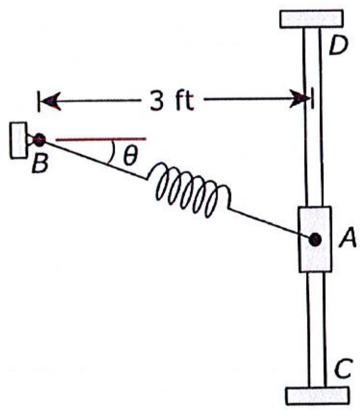
Geometry

A spring is attached at one end to support *B* and at the other end to collar *A*, as represented in the figure. Collar *A* slides along the vertical bar between points *C* and *D*. In the figure, the angle θ is the angle created as the collar moves between points *C* and *D*.



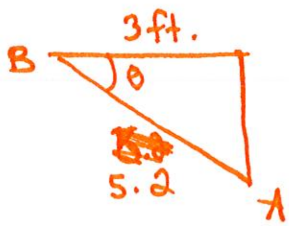
When the spring is stretched and the distance from point *A* to point *B* is 5.2 feet, what is the value of θ to the nearest tenth of a degree?

A. 35.2°

B. 45.1°

C. 54.8°

D. 60.0°

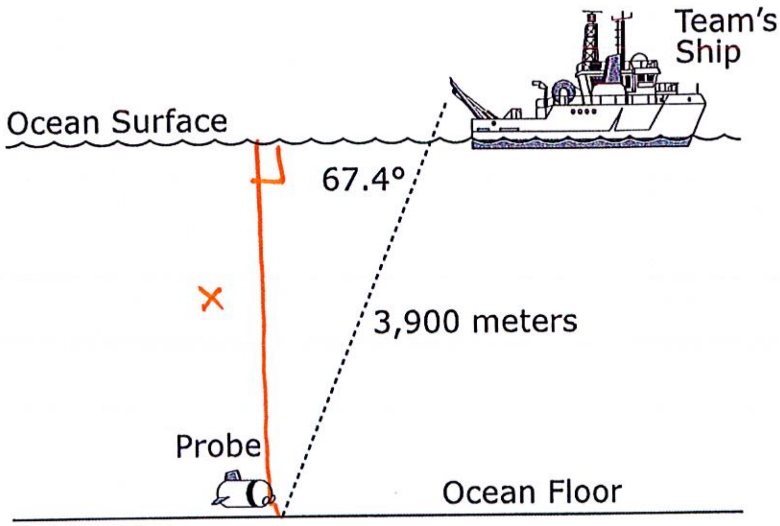


$$\cos\theta = \frac{3}{5.2}$$

$$\theta = \cos^{-1}\left(\frac{3}{5.2}\right)$$

$$\theta = 54.8°$$

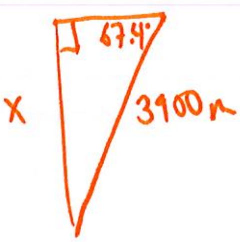
An archaeological team is excavating artifacts from a sunken merchant vessel on the ocean floor. To assist the team, a robotic probe is used remotely. The probe travels approximately 3,900 meters at an angle of depression of 67.4 degrees from the team's ship on the ocean surface down to the sunken vessel on the ocean floor. The figure shows a representation of the team's ship and the probe.



not to scale

How many meters below the surface of the ocean will the probe be when it reaches the ocean floor?

Give your answer to the nearest hundred meters. Enter your answer in the box.



$\sin 67.4 = \dfrac{x}{3900}$

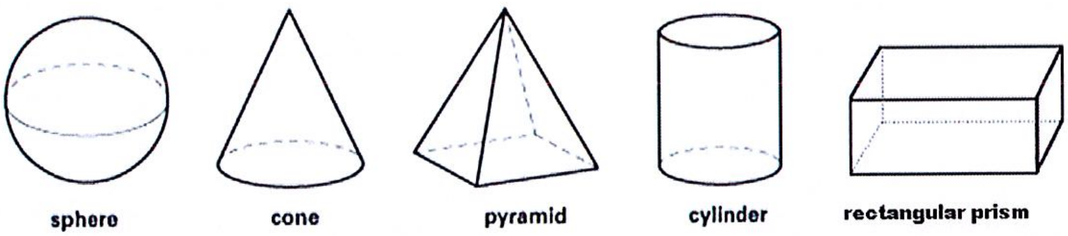
$x = 3600.5$

to the nearest hundred meters

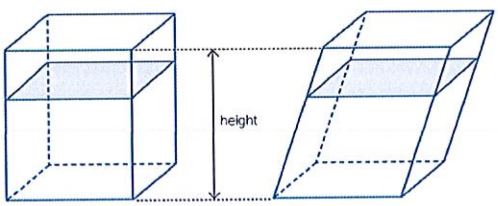
3600 m

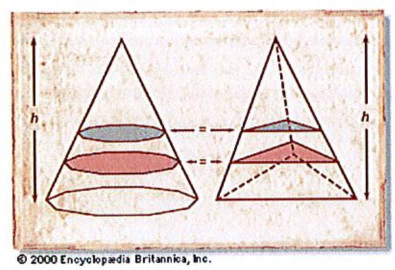
FINAL EXAM REVIEW – Area and Volume

- Geometric solids:

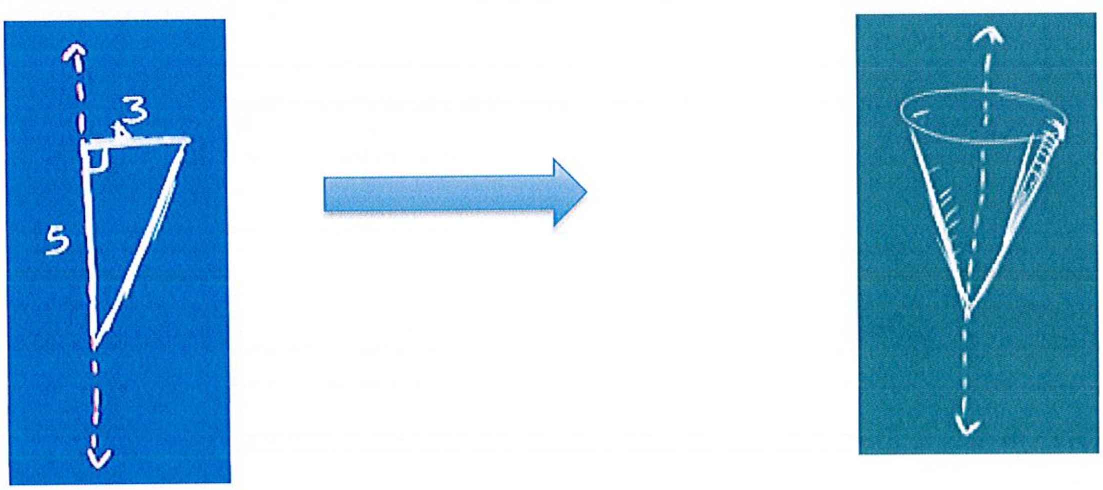


- <u>Cavalieri's Principle</u>: If two 3-D solids have the same height and cross sections of equal areas, then the two solids will have equal volume.





- <u>Rotating a 2-D Shape to Form a 3-D Solid</u>



- <u>Cross-section</u>: the 2-D figure formed by the intersection of a plane and a 3-D solid

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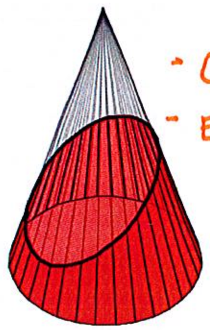
Geometry

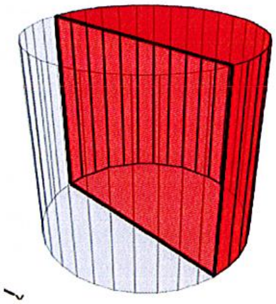
Directions: Identify the 3-D solid AND the cross-section.

1.



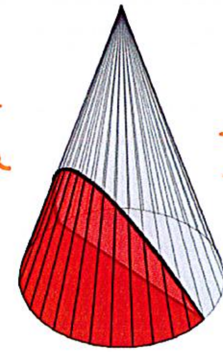
- Cone
- Ellipse

2.



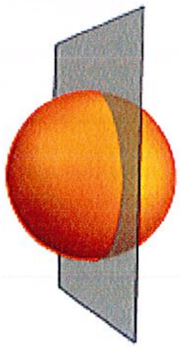
- Cylinder
- Rectangle

3.



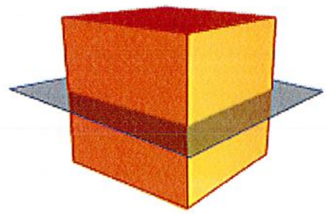
- Cone
- Parabola

4.



- Sphere
- Circle

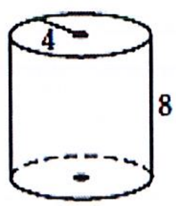
5.



- Rectangular prism
- Rectangle

Directions: Find the volume of each A and B pair. Which is bigger?

A.

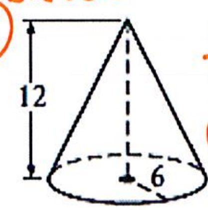


$\pi(4)^2(8)$

128π OR ≈ 402

BIGGER

B.



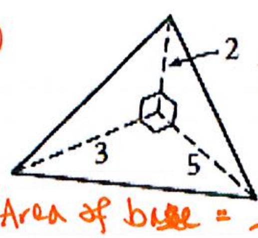
$\frac{1}{3}\pi(6)^2(12)$

144π OR ≈ 452

A+B are equal

pyramid

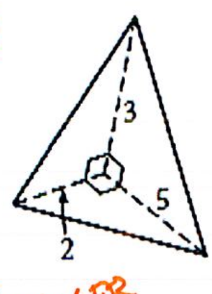
A.



$\frac{1}{3}(7.5)(2) = 5$

Area of base $= \frac{1}{2}(3)(5) = 7.5$

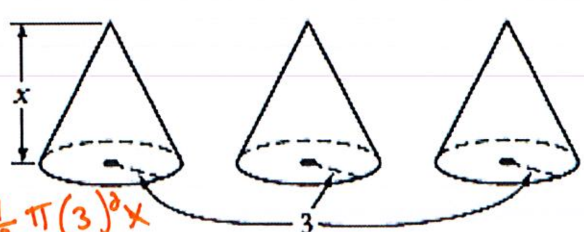
B.



$\frac{1}{3}(5)(3) = 5$

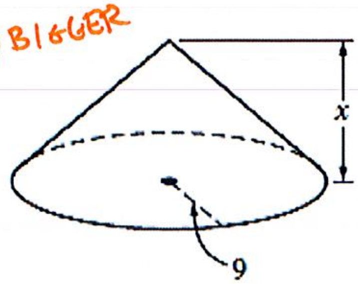
Area of base: $\frac{1}{2}(5)(2)$
$= 5$

A.



$\frac{1}{3}\pi(3)^2 x$
$= 3\pi x$ for one cone... 3 cones $=$ $9\pi x$

B. BIGGER



$\frac{1}{3}\pi(9)^2 x$
$27\pi x$